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### Cardiovascular stent design and vessel stresses: a finite element analysis

C Lally, F Dotan, PJ Prendergast - *Journal of Biomechanics*, 2006 - Elsevier  
 Intravascular **stents** of various designs are currently in use to restore patency in atherosclerotic coronary arteries and it has been found that different **stents** have different in-stent restenosis rates. It has been hypothesized that the level of vascular injury caused to a vessel by a ...  
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### Analysis of prolapse in cardiovascular stents: a constitutive equation for vascular tissue and finite-element modelling

PJ Prendergast, C Lally, S Daly, AJ Reid, TC ... - *Journal of ...*, 2003 - link.springer  
 The effectiveness of a **cardiovascular stent** depends on many factors, such as its ability to sustain the compression applied by the vessel wall, minimal longitudinal contraction when it is expanded, and its ability to flex when navigating tortuous blood vessels. The long-term ...  
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### Mechanical behavior of coronary stents investigated through the finite element method

F Migliavacca, L Petrini, M Colombo, F Auricchio, ... - *Journal of ...*, 2002 - Elsevier  
 ... F. Auricchio, M. Di Loreto and E. Sacco , **Finite-element** analysis of a stenotic artery revascularization through a ... O. Roquebert, J. Sainsous, M. Silvestri and G. Bayet , Elastic recoil of coronary **stents**: a comparative ... *Catheterization and Cardiovascular Interventions* 50 (2000), ...  
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### Balloon-artery interactions during stent placement: a finite element analysis approach to pressure, compliance, and stent design as contributors to vascular injury

C Rogers, DY Tsiang, JC Squire, ER ... - *Circulation research*, 1999 - Am Heart Assoc  
 ... tube design were mounted on 3-mm angioplasty balloons (Advanced Cardiovascular Systems/Guidant ... After positioning the **stent**-mounted balloon, colored water was injected into the ... **Finite Element** Analysis To study how individual components of the balloon-artery interaction ...  
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### Mechanical properties of coronary stents determined by using finite element analysis

F Eltawe, G Finet, M Boven, JC Boyer, G Ricoufol, G ... - *Journal of ...*, 2001 - Elsevier  
 ... Keywords: **Stent**; Angioplasty; **Finite-element** analysis; Mechanics; Simulation. Article Outline. ... In order to achieve this, we have used **finite element** analysis to model two different **stents**, each of which is most representative of its type, ie, one tubular and one coil-type **stent**. ...  
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### Finite-element analysis of a stenotic artery revascularization through a stent insertion

F Auricchio, MD Loreto, E Sacco - *Computer Methods in ...*, 2001 - informaworld.com  
 ... **Finite-element** Analysis of a Stenotic Artery Revascularization Through a **Stent** Insertion F. AURICCHIOa\*, M. DI LORETO\* and E. SACCOc "Dipartimento di Meccanica Strutturale, Università di Pavia, Italy; bDipartimento di Ingegneria Civile, Università di Roma "Tor Vergata ...  
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### Analysis of the transient expansion behavior and design optimization of coronary stents by finite element method

WQ Wang, DK Liang, DZ Yang, M Qi - *Journal of biomechanics*, 2006 - Elsevier  
 ... Keywords: **Stent**; **Finite element** method; Design optimization; Dogboning; Foreshortening. Article Outline. ... 3D geometrical models of **stent**/balloon 2.2. Constitutive material models 2.3. **Finite element** models 3. Validation experiments 4. Results 4.1. Simulation results 4.2. ...  
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### Realistic finite element-based stent design: The impact of balloon folding

M De Beule, P Mortier, SG Carrier, B Verheghe, ... - *Journal of ...*, 2008 - Elsevier  
 ... Realistic **finite element**-based **stent** design: The impact of balloon folding. ... c Colombia University Medical Center and Cardiovascular Research Foundation, New York, USA. ... At present, the deployment of an intravascular **stent** has become a common and widely used minimally ...

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**Stent expansion in curved vessel and their interactions: A finite element analysis**

W Wu, WQ Wang, DZ Yang, M Qi - *Journal of biomechanics*, 2007 - Elsevier

... 947–957. [View Record in Scopus](#) | [Cited By in Scopus](#) (22). Lally et al., 2005 C. Lally, F. Dolan and PJ Prendergast, **Cardiovascular stent** design and vessel stresses: a **finite element** analysis, *Journal of Biomechanics* 38 (2005), pp. 1574–1581. [Article](#) |.

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**A predictive study of the mechanical behaviour of coronary stents by computer modelling**

F Migliavacca, I. Petrini, V Montanari, I. ... - *Medical engineering & ...*, 2005 - Elsevier


... In this study the **finite element** method (FEM) was applied to a new generation coronary **stent**. ...

**Keywords:** **Finite element** method; Experimental test; Mechanical properties; Coronary **stent**.

**Article Outline.** 1. Introduction 2. Material and method 2.1. Computational simulation 2.2. ...

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... tube design were mounted on 3-mm angioplasty balloons (Advanced Cardiovascular Systems/Guidant ... After positioning the stent-mounted balloon, colored water was injected into the ... **Finite Element Analysis** To study how individual components of the balloon-artery interaction ...

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F Etave, G Finet, M Bovin, JC Boyer, G Roubil, G ... - *Journal of ...*, 2001 - Elsevier

... Keywords: **Stent**; Angioplasty; **Finite-element analysis**; Mechanics; Simulation. Article Outline. ...

In order to achieve this, we have used **finite element analysis** to model two different stents, each of which is most representative of its type, ie, one tubular and one coil-type **stent**. ...

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F Auricchio, MD Loreto, E Sacco - *Computer Methods in ...*, 2001 - informaworld.com

... **Finite-element Analysis of a Stenotic Artery Revascularization Through a Stent Insertion**. AURICCHIO F., M. DI LORETO\* and E. SACCO\* Dipartimento di Meccanica Strutturale, Università di Pavia, Italy; b Dipartimento di Ingegneria Civile, Università di Roma \*Tor Vergata ...

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[Mechanical behaviour modelling of balloon-expandable stents](#)

C Dumoulin, B Corbelli - *Journal of Biomechanics*, 2000 - Elsevier

... **Cardiovascular diseases** and mainly atherosclerosis are the major cause of death in western countries. ... 1997) proposed a computational model to assess the effects of a **stent** profile in ... This study shows how computer technique and **finite element analysis** can serve this purpose ...

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[Finite element analysis for the design of Nitinol medical devices](#)

N Rebelo, M Ferry - *Minimally Invasive Therapy and Allied ...*, 2000 - informaworld.com

... along with its biocompatibility, have given the material a wide range of applications, from thermal switches and electrical connectors, to **cardiovascular stents**. ... This article will discuss how **finite element analysis** (FEA) can be employed to hasten time to market of NiTi products, by ...

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[Finite element modeling of blood flow in arteries](#)

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CA Taylor, TJR Hughes, CK Zarins - *Computer methods in applied ...*, 1998 - Elsevier

... these connections must be formed in such a way as to ensure that when the geometric model is discretized by a **finite element** mesh generator ... be required is presented by the case of modeling the inclusion of a stentgraft (graft approximated as a thin shell, **stent** approximated by ...

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[Finite element evaluation of stresses on closed leaflets of bioprosthetic heart valves with flexible stents](#)

MS Hamid, HN Sabbah, PD Stein - *Finite Elements in Analysis and ...*, 1985 - Elsevier

... Elements in Analysis and Design 1 (1985) 213225 North-Holland 213 **FINITE ELEMENT EVALUATION OF ...** N. SABBAAH and Paul D. STEIN Department of Medicine, Division of **Cardiovascular Medicine**, Henry ... purpose of this study is to evaluate the influence of **stent** flexibility ...

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[Coronary stent implantation changes 3-D vessel geometry and 3-D shear stress distribution](#)

JJ Wentzel ... - *Journal of Biomechanics*, 2000 - Elsevier

... The resulting equations were solved with a validated **finite element** package (Septran, Septra, Leiden, the Netherlands) (van de Vosse et al ... of the artery near the **stent** edges, which resulted in high and low shear stress regions near the **stent** edges ... **Cardiovascular Research** 31, pp ...

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[A numerical and experimental study of periodic flow in a model of a corrugated vessel with application to stented arteries](#)

S Natarajan, MFR Mokhterzadeh-Delghan - *Medical engineering & ...*, 2000 - Elsevier

... Author Keywords: **Finite element**; Periodic blood flow; Bumps; Stented vessel; Wall shear stress. ...

The use of **cardiovascular stents** has increased substantially in recent years but the haemodynamic effects of ... Both the geometry of the **stent** and the level of intrusion into the blood ...

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**Mechanisms of aortic valve incompetence: finite element modeling of aortic root dilatation**

KJ Grande, RP Cochran, PG Reinthal, KS ... The Annals of thoracic ... 2000 - Elsevier  
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Original articles: **Cardiovascular**. Mechanisms of aortic valve incompetence: **finite element** modeling of aortic root dilatation. K.Jane Grande PhD b ...

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**Design optimization of coronary stent using finite element analysis**EC Yeo, O Yuan, JH Yeo - *ASAIG Journal*, 2009 - journals.lww.com

A **Finite Element** Method to optimize **design of coronary stent** is presented. The **stent** was modeled using computer aided **design** software, Pro-Engineer. IGES data from the modeled **stent** was imported to ANSYS 5.5 to generate the **finite element** model using a 8-noded ...

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**Balloon-artery interactions during stent placement: a finite element analysis approach to pressure, compliance, and stent design as contributors to vascular injury**C Rogers, DY Tseng, JC Squire, ER ... - *Circulation research*, 1999 - Am Heart Assoc

... lumen more than balloon angioplasty and reduce rates of restenosis after **coronary angioplasty** in ... the factors involved in vascular injury imposed during **stent** deployment might allow **optimization of stent ... Stents** of corrugated-ring or slotted-tube **design** were mounted on 3-mm ...

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**A method for investigating the mechanical properties of intracoronary stents using finite element numerical simulation**LB Tan, DC Webb, K Korte, STS Al-Hassani - *International journal of ...*, 2001 - Elsevier

... work is to develop a general FE procedure for modelling the structure of **coronary stents**. ... Therefore the only parameters which influence the **design** are the helical angle of climb ... and b). By employing this engineering reasoning, the requirements of the **optimisation** exercise are ...

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**Mechanical behaviour modelling of balloon-expandable stents**C Demoulin, B Corvellec - *Journal of Biomechanics*, 2000 - Elsevier

... Moreover, confronted with observations from practitioners, they might lead to a better understanding of the failure or success of a particular **design** and to work on the product **optimisation**. ... (1995) studied flow instabilities induced by **coronary stents** in vitro. ...

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**Finite element analysis for the design of Nitinol medical devices**N Ribeiro, M Perry - *Minimally Invasive Therapy and Allied ...*, 2000 - informaworld.com

... 3]. Its superelastic material properties have been exploited for the manufacture of **coronary** and peripheral **stents**. ... There are a number of different parameters that should be accounted for in any **design optimisation**. ... to quickly access his or her **design** and to iterate the **design** on a ...

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**Physical properties of endovascular stents: an experimental comparison**SH Dada, J Waksarchen, G Tepe, M Bitzai, TW ... - *Journal of Vascular and ...*, 2000 - Elsevier

... the usefulness of a **stent** system in tortuous vessels or when using a crossover ... The following stainless-steel **stent designs** were included in the investigation: Palmaz **stent** varieties ... Symphory **stent** (Boston Scientific Vascular, Natick, MA), and the SMART **stent** (Cordis, Johnson ...

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**Coronary in-stent restenosis--predictors, treatment and prevention**R Heffmann, GS Mintz - *European heart journal*, 2009 - Eur Soc Cardiology

... Versus Intravascular ultrasound-Directed **stent** placement (AVID) trial and the **OPTimization** with ICUS ... into a biocompatible polymeric coating may result in a hybrid **stent design** consisting of ... In a porcine **coronary in-stent** restenosis model, con- tinuous systemic administration of ...

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**Stress variations in the human aortic root and valve: the role of anatomic asymmetry**KJ Granthel, RP Cucklart, PG Rembail, KS ... - *Annals of biomedical ...*, 1998 - Springer

... the valve leaflets, 2.7 potential valve failure mechanisms, 5.17, 27 and the **design optimization** of stented ... for this asymmetry may have to do with the presence of only two **coronary** ostia in ... However, speculation as to the actual cause of the underlying **design** is beyond the scope of ...

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**Finite-element analysis of aortic valve-sparing: influence of graft shape and stiffness**PJ Grande-Ajen, RP Cochran, PG ... - *IEEE Transactions ...*, 2001 - proteoglycan.com

... 27) was imposed by applying tension at the distal ends of the **coronary** ostia and ... Al- though **optimization** of vascular graft **design** involves a greater number of variables than simply shape ... the evaluation of other material choices, and may con- tribute to the eventual **design** of a ...

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stents in a rabbit carotid artery model

S Shetty, P Libevick, V Dev, MC Fishbein, JS Forrester, ... - Circulation, 1996 - Am Heart Assoc  
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### Recent metallic materials for biomedical applications

 M Nanami - *Metalurgical and materials transactions A*, 2002 - Springer

Metallic biomaterials are mainly used for replacing failed hard tissue. The main metallic biomaterials are stainless steels, Co-based alloys, and titanium and its alloys. Recently, titanium alloys are getting much attention for biomaterials. The various kinds of new high strength α

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### Physical properties of endovascular stents: an experimental comparison

 SH Dorle, J Wierkichen, G Tape, M Bizer, TW ... - *Journal of Vascular med...*, 2000 - Elsevier

The hoop strength of the balloon-expandable stents ranged from 15.8 N/cm (Perflex) to 28.9 N/cm (AVE Bridge X). The stent weight increased with greater hoop strength (Perflex, 0.046 g/cm vs. AVE Bridge X, 0.061 g/cm). The self-expanding stents had a radial resistive force ...

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 F Auricchio, MD Loreto, E Sacco - *Computer Methods in ...*, 2001 - [Informaworld.com](#)

250 F. AURICCHIOetal., 1. INTRODUCTION Cardiac diseases represent the most common cause of death in Western countries and they are often related to coronary atherosclerosis [1], ie, to de- posits and fibrosis of the artery inner layer pro- ducing a local lumen narrowing or ...

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### Analysis of prolapse in cardiovascular stents: a constitutive equation for vascular tissue and finite-element modelling

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The effectiveness of a cardiovascular stent depends on many factors, such as its ability to sustain the compression applied by the vessel wall, minimal longitudinal contraction when it is expanded, and its ability to flex when navigating tortuous blood vessels. The long-term ...

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### [PDF] Shape memory alloys and their application to actuators for deployable structures

 W Huang - *Diss. University of Cambridge*, 1998 - [ntu.edu.sg](#)

The work reported in this dissertation was carried out in the Department of Engineering of the University of Cambridge between October 1994 and March 1996. First, and foremost, I extend the warmest and heartfelt thanks to my super- visor, Dr Sergio Pellegrino, for his ...

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### Measurement of the symmetry of in vitro stent expansion: a stereo-photogrammetric approach

 J Narracott, DR Hose, PV Lawford, J ... - *Journal of medical ...*, 2003 - [informahealthcare.com](#)

Balloon-expandable stents are used routinely in the treatment of coronary artery disease. Their effectiveness is limited by the occurrence of restenosis. Previous studies have suggested that the level of restenosis may be related to the deployed stent geometry, and in particular to ...

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### Development of titanium based biocomposite by powder metallurgy processing with in situ forming of Ca-P phases

 M Karanaj, R Sundaresan, GVN Rao, TRR ... - *Materials Science and ...*, 2007 - Elsevier

Composites of titanium and calcium-phosphorus phases were developed by powder metallurgy processing and evaluated for bioactivity. Titanium hydride powder and precursors of calcium and phosphorus in the form of calcium carbonate and di-ammonium hydrogen ...

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 蔡家伟, 王崇平, 龚传云 - *生物医学通讯*, 2005 - [hmphanmi.com.cn](#)

生物技术通讯 LETTERS IN BIOTECHNOLOGY Vol.16 No.6 Nov., 2005 ...

Mansfield[12]等最早进行了内皮化的研究, 他们将种植了内皮 细胞的涤纶植入大的动脉壁, 3 周后发现涤纶表面无血栓形成, 无炎性浸润。Herring 等[13]提出并证实了EC ...

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 M Karanaj, R Sundaresan, TRR Mohan, BP ... - *Materials Science and ...*, 2006 - Elsevier

Sintered Ti-Ca-P composites having in situ formed calcium phosphate phases developed by powder metallurgy processing were soaked for 28 days in simulated body fluid (SBF) with a pH of 7.4 at 37 °C and evaluated for the growth of calcium phosphate ceramics onto its ...

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### Finite element analysis of stent expansion considering stent, artery and plaque interaction

SM Kim, SY Park - *Artery* - [actapress.com](http://actapress.com)

FINITE ELEMENT ANALYSIS OF STENT EXPANSION CONSIDERING STENT, ARTERY AND  
PLAQUE INTERACTION Sung Min Kim1 , Sung Yun Park1 1 Department of Biomedical  
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C Rogers, DY Tseng, JC Squire, ER ... - Circulation research, 1999 - Am Heart Assoc

Abstract—Endovascular **stents** expand the arterial lumen more than balloon angioplasty and reduce rates of restenosis after coronary angioplasty in selected patients. Understanding the factors involved in vascular injury imposed during **stent** deployment may allow ...

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**Finite element analysis of a stenotic artery revascularization through a stent insertion**

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F Auricchio, MD Loreto, E Sacco - Computer Methods in ... , 2001 - informaworld.com

... of a balloon-expand-able **stent**, we develop a three-dimensional model of the complete system, ie, **stent**, plaque and **artery**. A large-deformation analysis is then performed using the commercial **finite-element** code Abaqus (MK&S) [23] and numerical results are ...

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**Mechanism of lumen enlargement during intracoronary stent implantation: an intravascular ultrasound study**

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JM Ahmed, GS Mitta, NJ Weissman, AJ Landis, AD ... - Circulation, 2000 - Am Heart Assoc

... 17. Rogers C, Tseng DY, Squire JC, et al. Balloon-artery interactions during **stent** placement: a **finite element** analysis approach to pressure, compliance, and **stent** design as contributors to vascular injury. Circ Res. 1999;84:378-383 [Abstract/Free Full Text]. ...

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**Mechanical behaviour modelling of balloon-expandable stents**

C Dumoulin, B Cochelin - Journal of Biomechanics, 2000 - Elsevier

... The numerical specifications of this work were the use of the **finite element** method with the program package ABAQUS 2 in static stress/displacement analyses, and a material assumed to be elastic and perfectly plastic. ... 3.3. Fatigue. As a **stent** implanted in an **artery** of a middle ...

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**A method for investigating the mechanical properties of intracoronary stents using finite element numerical simulation**

LB Tan, DC Webb, K Kormi, STS Al-Hakani - International journal of ... , 2001 - Elsevier

... 2.1. **Finite element** modelling. ... This type of analysis can be used to determine the initial design of a **stent** given the final required geometry, or to predict the final geometry given a particular design. 3.3.2. Simulation of **stent** deployment in a stenosed **artery**. ...

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**Subacute thrombosis and vascular injury resulting from slotted-tube nitinol and stainless steel stents in a rabbit carotid artery model**

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S Sheth, F Livniak, V Dev, MC Fishbein, JS Forrester ... - Circulation, 1996 - Am Heart Assoc

... **Finite element** analysis of the nitinol **stent** shows that the majority of the strut wall thickness ... This may in turn create better flow characteristics and less surface interaction with blood ... L, Sigwart U. Angiographic follow-up after placement of a self-expanding coronary-artery **stent**. ...

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S Westecker, I Mayer, G De Pasquale, W Maier, G ... - Circulation, 2001 - Am Heart Assoc

... 6. Rogers C, Tseng DY, Squire JC, et al. Balloon-artery interactions during **stent** placement: a **finite element** analysis approach to pressure, compliance, and **stent** design as contributors to vascular injury. Circ Res. 1999; 84: 378-383 [Abstract/Free Full Text]. ...

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**Physical properties of endovascular stents: an experimental comparison**

SH Duda, J Westrichen, G Tepe, M Bitzer, TW ... - Journal of Vascular and ... , 2000 - Elsevier

... Thus, the chronic outward force is a measure of the force the **stent** exerts on it tries to expand to its nominal diameter when the vessel is relaxed. The radial resistive force is a measure of the force the **stent** exerts as it resists squeezing by constriction of the **artery**. ...

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**Influence of stent design on 1-year outcome after coronary stent placement: a randomized comparison of five stent types in 1,147 unselected patients**

... , J Drexhager, P Boekhegers, S Elezi ... - Catheterization ... , 2000 - interscience.wiley.com

... Finally, different **stent** types may have different surface proper- ties that may influence significantly the **stent interaction** with the arterial wall and ... A comparison of balloon-expandable-**stent** implantation with balloon angioplasty in patients with coronary **artery** disease. ...


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C Briguori, T Nishida, M Adelman, R ... - Catheterization ... 2000 - interscience.wiley.com

... coronary **artery**. Superficial injury during **stent** deployment is the result of balloon and **artery** vessel wall **interaction**. It remains to be explained why **stenting** elicits a relatively higher pro- liferative response in small vessels. One ...

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